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# BRANCH OF RESEARCH

## MONTHLY REPORT

OF

DENDROLOGY
FOREST EXPERIMENT STATIONS
FOREST PRODUCTS
FOREST ECONOMICS
GRAZING RESEARCH

May, 1927.

GOVERNMENT PRINTING OFFICE 1 11937

BRANCH OF RESEARCH

May, 1927

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Forest Economics
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## FOREWORD

(From President's address at the annual initiation of the Iowa Chapter of the Society of Sigma Xi, State University of Iowa, Iowa City, Iowa, February 17, 1926. From Science, July 2, 1926).

(1) Select a basic problem for your research, one that you can work on for a period of ten years or more.

(2) Become thoroughly acquainted with the history of your problem and especially with contemporary experimental studies in your special field. Become well orientated and familiar with the principal theories and conclusions of others who have approached your problem. Frequently you can find the best cues for your attack in earlier studies.

(3) Strive for a complete bibliography of your special subject; do not be satisfied with a few general references. References are of little or no value unless they are complete.

(4) Take accurate, detailed notes each day and keep them in an accessible file. This will furnish the material for your final report, for it is very difficult to write a final report with statistical data only. Keep a notebook or pad in which you can jot down your original ideas and theories from time to time. These original ideas are frequently the most important contribution.

(5) Do not spare any effort in securing accurate data. One of the greatest enemies of first-class scientists is the use of inaccurate data.

(6) Study carefully your experimental technic and present your data in the best statistical form. Be certain that your tables are self-explanatory and presented in such a way that the number of observations are apparent. See that the charts and curves are also self-explanatory and constructed according to the best modern standards.

(7) Lastly, I would say, look for the relationship of your problem to the larger field of which it is a part. Many scientists are unable to see the woods for the trees. Reorientate the problem. In doing so you will acquire the true research spirit, not the kind that terminates with the degree of doctor of philosophy.

## A WORD OF PHILOSOPHY

Glenn Frank

There are very few general truths that are universally applicable; most problems must be solved in terms of particular places and particular persons.

We need less sweeping generalization and more sincere experimentation.

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## FOREST EXPERIMENT STATIONS

### Washington

#### General

During May there were a number of absences in the Branch of Research; Clapp, Betts and Marsh went to the Laboratory to attend the annual program conference, Mr. Clapp not returning until the first of June. From Madison Marsh went to St. Paul, where he spent some time with the Taxation Inquiry group.

Because of the press of other work and unforeseen delays the proposed selection of headquarters trip through the Ohio-Mississippi Valley scheduled for May was postponed until some time in June. In company with Mr. McCarthy Mr. Clapp plans to visit a number of places suggested as possible headquarters. This makes it impracticable for a similar survey to be made of a headquarters center for the Allegheny Station prior to some time in July. The office has received many offers of cooperation for the new stations.

Haig continued in Washington on his western white pine yield study, upon which the energies of the computing force have been engaged since early winter. Haig is still far from his goal of completing the study, although he has made notable progress in overcoming the many difficulties entailed.

Philip Wakeley, from the Southern Forest Experiment Station, visited the office for a short time during which he was given some help in making out a card-punching code and in arranging his plantation data for statistical analysis on the tabulating machines.

Mr. Sudworth's death has made a big gap in our organization and his loss is very keenly felt. No plans as yet have been made as to filling the vacancy thus created. For the present, the identification work will be handled in cooperation with Range Research and with the Bureau of Plant Industry.

#### Examinations

The scheduled examination for positions in the silviculturists grades was closed on May 17 and informal advice from the Civil Service Commission indicates that somewhere in the neighborhood of 25 individuals have sent in papers. How many will be on the final register after those not qualifying have been eliminated is as yet unknown.

An examination for the superintendent of naval stores field station for Starke, Florida, is now being held. This is a position which requires duties similar to those of a ranger or caretaker of an experimental forest, although the Southern Station has no forest at Starke under its entire jurisdiction.

Library

Last month the library loaned 947 books and periodicals, and 140 members of the service and others consulted the library in person.

During the month 281 books and periodical articles were indexed for the catalogue.

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## NORTHEASTERN FOREST EXPERIMENT STATION

Mr. Dana spent practically the entire month in an effort to round out the report on minimum requirements for the Northeast, except for one day when he addressed the field meeting of the Connecticut Forestry Association at the Rainbow Plantations on May 14.

Behre completed a manuscript on Preliminary Yield Tables for Second Growth Western Yellow Pine in the Inland Empire, based upon records of 83 plots secured in 1922 and 1923 while he was at the University of Idaho. The tables show mean annual growth in board feet on average sites culminating between 90 and 100 years, when it reaches a volume between 330 and 400 board feet per acre per year. The wide range of sites covered is one of the remarkable features of this study. On the best sites a maximum mean annual growth of 772 feet is attained at 60 years of age, while on the poorest sites the mean annual growth is only 44 board feet and no culmination is indicated up to 180 years of age. Total cubic foot yields at 100 years of age range from 1060 to 9270 cubic feet per acre, and at this age the average diameters range from 6.5" on the poorest sites to 20.5 inches on the best. On average sites at 100 years the cubic foot yield is about 5,400 cubic feet, and the trees average 15 inches in diameter and 82 feet in height. The trees in evenaged western yellow pine stands are distributed quite regularly according to the normal frequency distribution, so that stand table graphs based on the normal frequency could be constructed.

Westveld completed his manuscript on "Reproduction on Pulpwood Lands in the Northeast with Suggestions for their Management," and got it on its way to the board of review. At the end of the month he left for field work on the permanent sample plots near Twin Mountain, New Hampshire, where he was joined by Gast who will do some additional work in soils and also on his solar radiation observations.

MacAloney left on the 31st for a three months' furlough in Canada, where he will make a survey of white pine weevil conditions from New Brunswick to Ontario for the Dominion Government.

The fire weather studies were begun at Elk Lake and Cranberry Lake in the Adirondacks, and at the Harvard Forest, near Petersham, Massachusetts. Stickel and Chapman left on the 31st for Ashland, Maine, where a fourth station will be established in cooperation with the Maine Forest Service.

Progress on the computations for Dana's study of fire statistics in the New England States and on Behre's form studies continued during the month.

Spaulding has his report on the decay of white pine slash in southern New England ready for final review and criticism before presentation for publication as a bulletin. Several lots of mixed slash in southern New England were examined during the month.

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## LAKE STATES FOREST EXPERIMENT STATION

Spring opened early this year in the Lake States and with it work in the field. Before leaving for the field, the men worked intently to complete their winter office work. Mitchell completed his manuscript on "Forest Fires in Minnesota." Zon, in cooperation with Garver from the Forest Products Laboratory, completed the report on Selective Logging, with especial reference to handling small and large trees. Kittredge prepared his paper for the International Soil Congress, entitled "The Use of Soil Surveys in Forest Classification," and continued work on his oak and aspen studies.

One of the outstanding events of the month was Wackerman's leaving the Station, which, with Brown's leaving earlier during this year, reduced the permanent staff to only three men. It may be of interest to other Experiment Stations to know the reasons for Wackerman's leaving research for commercial work. His letter of resignation, therefore, may be not out of place.

April 7, 1927.

"Dear Mr. Zon:

"With a great many regrets I hand you herewith my resignation from the Forest Service. I have been offered the position of forester for the Crosset Lumber Company, and after considering it for some time I decided to accept. The Company has 400,000 acres of second-growth and virgin shortleaf and loblolly pine timber with some oak and other hardwoods. They have definitely decided to work towards sustained yield and have organized a forestry department with Prof.

R. C. Bryant as consulting forester. My work will be, at first, to secure technical information necessary to plan the operations of the Company on a perpetual basis.

"I realize that I am sacrificing a great deal in leaving the Station, and, had I followed the dictates of my personal preference, I should have declined the Crossett offer. However, it has seemed to me that one of the great obstacles in getting forestry practiced in privately-owned timberlands is that a great many foresters do not know, intimately, the practical problems confronting a company when it really embarks on forest management.

"In my new work I expect to be confronted with these problems and from close contact with the whole operation, I hope to get a better idea of how forestry can be profitably practiced by private interests. If my services prove to be of value in advancing the practice of forestry by a private company, I shall feel amply repaid for giving up my pleasant surroundings and congenial work.

"My four years at the Station in close contact with you and the other members of the Station staff have meant a great deal to me personally and professionally. I can not attempt to value the inspiration I have received from working with you and having your clear vision and sound principles continually before me. Although I am to be in somewhat different work in a different region, I am sure that I shall continue to draw much inspiration and benefit from those with whom I have been associated.

"It is hard to leave the Forest Service family, and especially the Lake States family circle. I realize, too, the obligations I have in carrying the ideals of public service into private work and to make forestry for the private owner of public benefit as well. I leave with best wishes for the continued success of the Station in its great work and for the success of my friends, its staff.

Very sincerely yours,

A. E. Wackerman."

Wackerman endeared himself to everyone at the Station, and his leaving was not only an official but also a personal loss.

By May 1, the entire staff, including the Director, was in the field. Most of the spring field work consisted of establishing permanent sample plots on the Minnesota and Superior National Forests and in the hardwood forest of the Upper Peninsula branch station, all our efforts being bent toward establishing permanent sample plots before growth began.

Zon, Kittredge, and two temporary field assistants, left early for the Minnesota National Forest. Permanent sample plots were established in the drained swamp. The reproduction strips in the study-of-cutting methods in 100-year red pine to encourage white pine reproduction were recounted. Reproduction strips and seed spots on the aspen-white pine conversion plots were recounted. The 55-year jack pine methods-of-cutting plots to encourage jack pine reproduction, which were cut over last winter, were tagged, tree measurements and descriptions made, reproduction strips counted, and other notes obtained. The cutting and slash disposal were carefully and well carried out, thanks to the interest of Supervisor Marshall and Ranger Cummings. Some unavoidable loss to reproduction in logging was observable, and some of the red pines, 2 and 3 inches in diameter, were browned in the slash burning. Apparently, they are very susceptible to this form of damage, for it was evident even in trees as much as 20 feet from the nearest brush pile.

The swamp project plots, one chain wide, running across the swamp from shore to shore and perpendicular to the ditches were run out and complete tree descriptions of all tagged trees made on each. A little over 2 acres in the aggregate were covered by plots. Reproduction strips were run through the center of each plot, and all small trees recorded and notes on vegetation made. It was interesting to see the leatherleaf in full bloom and the tamarack coming into leaf before the ice was melted 8 inches below their roots. A small plot was also laid out in the adjacent undrained swamp. The tenacity of the peat for water was well illustrated by the water level in one of the wells, 3 feet from a ditch, in which the water stood $1\frac{1}{2}$ feet below that in the well, even after the ice was gone.

Plans were made also for the location of thinning plots in middle-aged and young red pine stands — the new project which was proposed by the Forest and District officers last winter. Suitable areas for plots were found in 20 and 40 year stands on the Cutfoot-Sioux district. A tentative outline of the object and methods of thinning was ddrawn up and discussed with Supervisor Marshall and members of the Forest force. This new project will not be started until fall.

At the end of the month, Kittredge went to Ely to work on the 60-year jack pine methods of cutting plots on the Superior Forest, where the reproduction problem is to encourage spruce or pine. The cutting of the plots was completed by the National Forest force this spring.

The Upper Peninsula branch station at Ruse, Michigan, was opened for the season May 1, with Mitchell in charge and two temporary field assistants to help in the establishment of the permanent sample plots.

Frequent rains and cold weather have hampered outside work but sample plots have been laid out on the plot cut over last fall and in a representative stand of virgin hardwoods, and the work of measuring and tagging the trees is progressing as fast as the weather will permit. Meteorological observations have also been resumed in both the forest and swamp. The season is late this year, the leaves as yet having only started to come out.

Improvement work this spring has so far consisted in completing the clearing up of the station grounds, in plowing the lawn and nursery, and in completing the fencing of the administrative site with the exception of hanging the gates and stretching the front fence, material for which has not yet arrived, although ordered early in the month. Seeding the lawn and completing the preparation of the nursery have been held up by wet weather, but will be done as soon as it dries off sufficiently. Seedling and transplant stock has been requested and promised by the Michigan State College and the Michigan Department of Conservation. Requests have also been made for stock from Cass Lake and East Tawas.

Zon, on his trip to Michigan, stopped in Chicago and gave three talks, one before the Illinois Conservation Council, one before the State Educational Conference at the University of Chicago, and one before the graduate students and faculty in Botany at the University of Chicago. On his return trip from Michigan, he stopped at Madison, where he participated in a conference between lumbermen and economists in drafting a forest tax bill, and in the discussion of the Forest Products Laboratory program.

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## APPALACHIAN FOREST EXPERIMENT STATION

### General

The first casualty to the original staff of the Appalachian Forest Experiment Station since its establishment in 1921 is the pending transfer of E. F. McCarthy to become Director of the new forest experiment station in the Ohio-Mississippi Valley region. McCarthy's departure will leave a place difficult to fill. The staff as a unit regrets this loss but rejoices that McCarthy will still be a close neighbor. This transfer naturally upsets plans for summer work. May was accordingly devoted largely to revising plans, preliminary field reconnaissance, and the remeasurement of some of the permanent sample plots established by McCarthy.

The return of Korstian and Hursh from work in eastern North Carolina carried them through Davidson, N. C., at the time of the meeting of the North Carolina Academy of Science, which they attended. Korstian summarized the general results of the loblolly pine survey before the Academy, and conferred with several of the members regarding cooperative Station work.

In company with Professor G. A. Garratt of Yale School of Forestry, Korstian made a short trip to Canton, N. C., for the purpose of examining the Station's seed beds put in by Sims. The beds of yellow poplar, red spruce, southern balsam fir, and Norway pine are looking especially fine. The stock in the entire nursery is showing good recovery from last spring's freeze.

Radio talks were broadcast Monday nights in May from Station WWNC, Asheville, by McCarthy on "Forest Fire Damage," Frothingham on "The Growth of the Forests," Beal on "Insect Enemies of the Forest," Supervisor R. W. Shields on "The Nantahala National Forest," and Assistant Supervisor J. W. McNair on "The Chestnut Blight." Other talks are scheduled for June. These are under the auspices of the Southern Appalachian Section, Society of American Foresters.

## Fire Damage Study

The permanent fire damage plots at Bent Creek and in the vicinity of Old Fort were re-examined by Sims, Beal and one assistant. The data from the plots will be incorporated in our fire damage report.

## Yellow Poplar Reproduction

Re-examination of the poplar regeneration plots at Bent Creek showed a material reduction in the number of yellow poplar seedlings which originally germinated. A report on this work will be included in the poplar bulletin.

## Yellow Poplar Seed-spotting

In order to test the feasibility of seed-spotting yellow poplar Sims put out several hundred poplar seed spots, using seed which had been stratified over winter on three different sites. Although the work was done carefully, considerable doubt as to the outcome has already arisen because of damage by animals, especially rodents. The seed in many spots has been dug up and eaten. In some of the spots in the open the seed was washed out by heavy rain.

## Liberation of Yellow Poplar

Korstian, Eyre, and Hursh reexamined the yellow poplar liberation cutting plots at the base of Lookingglass Rock on the Pisgah National Forest. These permanent sample plots were established by Frothingham and Korstian in the fall of 1923.

The site is of high quality. Forty thousand board feet to the acre, one-half poplar, was cut from the area in 1913 by the Carr Lumber Company. Two years later there were 5,000 yellow poplar seedlings to the acre, but a severe fire in May, 1916, killed all the reproduction and growth. In 1922 a tally showed a preponderance of chestnut, silverbell, locust and red maple sprouts, with much sumac. There was a well distributed reproduction of yellow poplar seedlings which were rapidly becoming suppressed by the sprout growth and sumac.

Four one-half acre sample plots, with interior reproduction plots, were established in this area in the fall of 1923. Two were reserved as controls, while in the other two liberation cuttings for poplar were made in June 1924. In one all the chestnut, silverbell, and dominant sumac were cut. The other was given a lighter cutting, removing only the chestnut and silverbell. An average of 739 chestnut, 665 silverbell, and 369 sumac per acre were removed from the liberation plots.

The 1927 tallies of the reproduction plots show a very satisfactory increase in height growth of the liberated poplar. In the control plots the average height of the poplar reproduction less than one inch in diameter breast high is the same as was the average height in 1924. This would seem to indicate that suppression and injury has just balanced the new growth and reproduction. In the plots in which the poplar was liberated the poplar reproduction has increased in height fifty-six per cent over the average height at the time of liberation.

Where the chestnut and silverbell were removed the poplar is coming up through the locust, walnut, and sumac, where these species occur. The chestnut sprouts have become badly infected with blight. Many have been killed already and it is evident that these sprouts will hold back the poplar very little. Probably no further cutting of the chestnut will be necessary. The larger poplar reproduction one inch and over in diameter breast high is coming into the upper crown cover in excellent shape.

## Loblolly Pine Survey

The spring work on the extensive survey of cut-over loblolly pine lands was finished the first week in May and the field party, consisting of C. F. Korstian, F. H. Eyre and C. R. Hursh, returned to Asheville.

While in the eastern part of the State the fire damage sample plots northeast of Fayetteville, which were established in loblolly pine by McCarthy and the Southern Forest Experiment Station party in 1925, were examined. While the records have not been worked up as yet, there seems to be very little correlation between diameter and mortality, as trees as large as twenty-two inches in diameter were killed in the mature stand, and trees down to eight inches commonly survived. A closer correlation was noted, however, between mortality and the amount of injury to the crown.

## Reconnaissance of Cut-over Areas

During the week of May 23 McCarthy, Hursh, Buell and Sims examined several areas on the Unaka National Forest to determine their value for this summer's survey of cut-over areas. Decisions were made on the ground as to the desirability of certain cuttings for the present study, and methods were suggested for the benefit of Buell and Sims who will have charge of the field work this summer. Sufficient work was laid out to keep the field party busy for a month or six weeks, at least.

Among the areas selected for study was a cutting in typical northern hardwoods on Big Bald Mountain near Flagpond, Tenn., in the Erwin District of the Unaka Forest. Another sale which should yield interesting data is that of the Damascus Lumber Company near Damascus, Va. White pine, yellow poplar, and oak seed trees were left in this cutting and their effectiveness will be studied. On the Carter District an area in Stoney Creek drainage which was clear cut ten years ago had been previously cut for charcoal over its more accessible sections. The results of this double cutting will be noted.

## Oak Growth and Yield Study

During the month the chestnut oak data were sent to Washington and the tabulations in the card machine were completed. These data have been retained in Washington where, Kellogg will in June spend some time computing volume tables from them while familiarizing himself with the technique employed in this work.

The figures for some 630 scarlet oaks have been plotted, and the volumes for a part of them computed.

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# SOUTHERN FOREST EXPERIMENT STATION

## General

During the month Pessin completed the arrangement of the greater part of our herbarium, making it more readily available for reference than at any time since the establishment of the Station. Only a few special collections remain to be taken care of.

Visitors during the month included H. H. Bennett, Bureau of Soils, who made a special trip from South Mississippi to New Orleans to discuss erosion in its bearing on floods, and whose admirable article on this subject we helped him to place in a Sunday edition of the Times-Picayune.

Protection, Fire

The Station helped State Superintendent of Forestry Hine prepare a system for analyzing his state fire statistics by means of punch cards.

Measurements

Gemmer reports that Weinstein, working at Camp Pinchot, finds by microscopic examination some of the mature longleaf on the Choctawhatchee Division formed summer wood cells as early as May 1 this year.

The question of how to compute volumes of permanent sample plots forced itself upon us more insistently than ever in connection with office work on thinning plots. We have no standards by which to compare the accuracy and appropriateness of various methods of computation, nor do we find any anywhere else. Plots laid out by ourselves in the past, or inherited from other agencies, differ far more in completeness of measurements taken than is justified by the diversity of the plots themselves, and until we standardize our methods new plots will inevitably continue to differ. The time required for field work and for computations, the data available or required, the degree of refinement necessary to distinguish significant differences between plots, the adequacy of volume tables, and the difficulty of obtaining volumes of very small trees, all bear upon the problem.

Management

Work was started in earnest on the Requirements Report, and took more of Forbes' time than any other one project. Most of the rest of the staff assisted at intervals.

Demmon continued his work upon extensive survey data, completing reports thereon for South Georgia and North Florida, and for most of the North Carolina trip. Wahlenberg spent some time helping him with drafting in connection with these reports, and devoted an additional day or two to a study of the scanty literature available on the subject of the permanent sample plots already discussed.

An incendiary fire wiped out one natural reproduction plot in loblolly and shortleaf pine at Urania, and a factor slightly disturbing to some of the rest was introduced when 300 head of cattle from the flooded districts of Louisiana were placed in the Greeley Pasture.

Barrett spent the most of the month at Urania, where he laid out some plots in mixed loblolly and shortleaf from which oaks had been removed in thinning, and selected places for several permanent yield plots.

At Camp Pinchot, Gemmer has been preparing a five-year progress report on the longleaf reproduction plots established in 1922, and on some increment core counts of the seed trees on the new plots laid out this spring. He also worked up notes on the reproduction survey made last January.

## Naval Stores

Wyman and Sanders made a one-day trip to Brunswick, Georgia, to study Benedict's French and American faces. From there they went to Cogdell, Georgia, where they looked in on Sessoms' operations, and to Fargo, where Captain Eldredge has 6500 French faces six inches wide and roughly worked, but giving fair yields.

The first dip was made on all three tracts at Starke, on six streaks at Kingsley and Sampson Lakes, and on seven streaks at Powell.

## Forestation

In connection with a northern trip, Wakeley spent ten days in Washington putting plantation data on punch cards.

Wahlenberg took down the last of the germination tests and made cutting tests of the ungerminated seed.

Gemmer reports 28 per cent survival in the small longleaf plantation made at Camp Pinchot in February. The planting stock — two-year-old seedlings — had already started new growth when planted, and there has been an extreme drought ever since. Gemmer feels much encouraged by the results, and predicts that with plantations made at the proper time in an average season, good results will be obtained. Only 15 seedlings are left to show for 500 seed sown in prepared spots at Camp Pinchot in February. Much of the loss in this direct seeding was definitely traced to black ants, which tore off and carried away the cotyledons as soon as the seed germinated.

Pessin, who has been working on the quadrats at McNeill, Mississippi, reports the prospect of a heavy crop of longleaf pine seed next fall. This is an encouraging verification of similar predictions by woodsmen and foresters in Southern Mississippi and Louisiana.

## Protection, Others

Grazing. Pessin made some examinations at McNeill on longleaf seedlings in the burned half of the pasture. Although this count is nearly a month later than any previous counts made after burning, Pessin recommends that this examination be made in July hereafter, to avoid uncertainty as to death or recovery of seedlings badly burned but not kille outright at the time of the fire.

In the office Pessin re-worked his report, and compiled and filed all data so far accumulated in the grazing study at McNeill. In connection with this work he also devised a quadrat mapping form which will permit putting four years' notes on a single sheet.

Disease and Insects.- At Camp Pinchot, Gemmer tagged 100 rusted longleaf seedlings on an unburned area, and 50 on a burned area adjacent, recording different degrees of infection, as a preliminary study of the seriousness of rust on the Choctawhatchee and the effectiveness of fire in controlling it. At McNeill Pessin noted rust as high as 12 feet above the ground on longleaf trees eight inches d.b.h., an interesting observation in view of the general belief that the rust works only within a foot or two of the ground.

St. George and Baumhofer, of the Bureau of Entomology, who stopped at New Orleans on their way to Bogalusa to collect specimens of tip moth, informed us that so far no effective control of this pest is known, and checked our own observations that the tip moth does little work on trees more than 12 or 15 feet high. Gemmer collected additional tip moth material for Dr. Craighead at Camp Pinchot and also sent him specimens of ants.

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## CALIFORNIA FOREST EXPERIMENT STATION

### General

Field work is now in full swing with three parties in the field. Kotok attended a meeting of the Los Angeles County Forestry Department where a cooperative agreement for future work was tentatively drawn up. Kotok accompanied Colonel Greeley on a tour of the redwood region, visiting the nurseries, field planting, and second growth stands. A complete abstract for a statistical study of fires from 1921-1926, inclusive, is now being handled by two office assistants.

### Management

A marking board for the California District assembled on the Stanislaus Forest to study the present silvicultural systems in the mixed conifer type. Sixteen forest officers, headed by the Forester, together with representatives from the offices of Entomology and Pathology, the resident forester of the Pickering Lumber Company, and their logging superintendent visited present cutting areas, as well as some permanent sample plots on older cuttings of this company. Sample markings were made in the mixed conifer type and in two stands where white fir because of its heavy proportion of the stand presents a real economic and pathological problem.

Dunning's manuscript on tree classification was used as a basis for discussion of our present marking rules in the mixed conifer type. This conference brought out that our point of view of reserve stands needs clearer definition if we are to accomplish what the marking rules aim to do. The leaving of heavy reserve stands where the second cut will be long delayed is fraught with much danger, as indicated by Dunning's study. Our old plots clearly show that losses, particularly from bark beetles in reserve stands of maturity may frequently exceed the growth increment and even be totally wiped out before the next cut. On the other hand, heavier cutting has generally produced a better release of advance reproduction, and the life of individual overmature trees has not increased seeding. The tendency to favor sugar pine frequently leads to leaving undesirable trees susceptible to heavy loss. It is particularly instructive to visit the sample plots established in 1910, where time has had a chance to prove the effectiveness of our silvicultural methods. The party visited a permanent sample plot in pure white fir 70 years old with a stand of 75 M board feet per acre. This was one of the most stimulating management meetings held in recent years, and we are looking forward to frequent field excursions of this kind in the future.

## Planting Research

A tentative arrangement has been prepared as to the division of labor in nursery and planting research between the administrative organization and the station under the proposed enlarged planting program. The Station for the present will carry on the planting work in southern California. In northern California the Station will tackle such research problems as the administrative organization may point out from time to time, and will immediately undertake some work in outplanting in the more difficult situations as presented in the brush fields.

## Southern California

Walter C. Lowdermilk, recently returned from the University of Nanking, has been engaged as an assistant for the work in southern California. He is now setting out some vegetative succession plots in various aged burns and is also starting a preliminary study of erosion on a 200 acre burn near Devil's Canyon. Lowdermilk proposes to spend a year at the University of California for an advanced degree, using as the subject of his thesis, "A Quantitative Study of Surface Runoff of Rainfall for Typical Forest Soils of Southern California."

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Meetings have occupied a good deal of the Director's time this month. First there was the annual meeting of State Fire Wardens at the State House in Salem, Oregon, which he attended. The next week he was at the forest supervisors' meeting in Darrington, Washington, while the forest management subjects were being discussed. The matter of placement of seed trees in Douglas fir timber sales came in for much discussion in the light of the recent studies of the Station on seed dissemination and natural reproduction. The last week of the month Munger spent at the yellow pine supervisors' meeting on the Whitman Forest. Here an entire day was given over to slash disposal. Westveld was present at this session and the results of his study were presented. Prior to the meeting a digest of his findings had been given to each supervisor. The recommendations of the Station were received very favorably and the indications are that this study will soon result in some modification of present practices which will mean both larger timber sale receipts and better silviculture.

Mr. Guy T. Allen, Assistant Director of the Bureau of the Budget, was in Portland for one day, and in the afternoon was taken up the Columbia River Highway to Wind River by C. H. Purcell, District Engineer of the Bureau of Public Roads, District Forester Granger, and Director Munger. Two or three hours were had looking over the experiment station plant, the nursery, and the ranger station, in all of which he was much interested.

At the request of Dean Peavy a suggestion was made of a study for one of his graduate students to undertake. The study suggested was "Silvicultural and Economic Effects of Small Mill Operations in Lane County," and a rough outline was prepared.

Isaac in the course of the month has covered practically all of the semi-permanent natural reproduction plots on logged-off areas. Scarcely any Douglas fir seedlings were found on any of the plots probably explainable by the scarcity of good seed last year. Munger worked with Isaac on the Hood's Canal series of plots. The Wilark seed catchers contained considerable seed up to 800 feet from the green timber, which was caught during the early spring months.

About half of McArdle's time was spent in writing the report for the the Douglas fir yield study and the other half about equally divided between fire studies and general routine. A working plan for studying the behavior of going fires was written and that will be his major study this summer - when and if there are fires to see - and between times he will be on the Douglas fir slash study.

An interesting test of tools to build fire trails was made by the Office of Fire Control on the Deschutes Forest and Mr. McArdle represented the Experiment Station as one of the viewers of these ex-

periments. Ten different kinds of plows and graders were tried out in a typical yellow pine forest. The relative efficiency of horses and small tractors in pulling these tools also was studied. The tools tested included: Rubottom plow, Beatty plow, Oliver reversible plow, ordinary road drag, a modified drag called a ditcher, a road grader, a "pan-buster," single and double disk plows, disk harrow, road "scarifier." One conclusion from this test is that ordinary agricultural implements should be modified to fit forest conditions. The share on ordinary plows invariably catches in roots and rocks and this trouble is not entirely eliminated by using a rolling colter. The frame of the disk plows is too near the ground and brush clogs up under the frame. Another conclusion is that the draw-bar of any implement must be high enough above the ground to prevent the catching and holding of brush in front of the tool. This is a defect common to all the drags, the Beatty plow, and the disk plows. A third conclusion is that the small caterpillar tractor is much more flexible and efficient than a team of horses.

The implements which did the best work were the disk plow and a "home-made" modification of the pan-buster. From this test it seems that good results could be obtained with a single disk plow, twenty-four inch disk, mounted on a frame at least two feet above the ground in front, and with the axles of the front wheels fastened rigidly. This rig makes a trail about 8 inches deep, about 6 inches wide, and throws the dirt well broken to one side for a distance of about 2 feet. Pulled by a two-ton caterpillar this plow made a good trail at the rate of one mile in thirty minutes, and went up a 30 per cent grade with ease. The pan-buster is an implement designed for use on farms in breaking up hardpan. It consists of a rather heavy steel frame supported like a cart on two wide wheels four feet in diameter. A steel bar drops down from the rear and on the bottom of this bar is a long point projecting toward the front, as in a Rubottom plow. The modification of this which was made on the spot with the assistance of a local blacksmith was to remove the long point and fasten as substitute a double moldboard, one board on each side of the bar. In completed form this resembled a shovel plow or middlebreaker, except that the moldboards were much larger and longer and the point, or share, instead of curving down and outward, was brought back and in like the prow of a ship. This implement made a rounded, scooped-out trail about 8 inches deep and a foot wide and threw the dirt well broken up a foot on both sides of the trench, making a good trail about three feet in width. With a tractor a mile of trail can be built in thirty minutes, and on good ground three miles can be built in an hour. Brush three feet high is uprooted and thrown to one side and the implement clogs very little. Of all the tools tested this one gave the best results. It was thought that by substituting a double disk plow for the moldboards even better results could be obtained.

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Marshall started the field season May 24 on the natural reproduction study. He will have three field assistants. Marshall's men will work on the natural reproduction project in the early part of the season and will be engaged in the methods-of-cutting study later in the summer. A fourth man will assist in fire studies.

The field work on the natural reproduction project, to be undertaken by Marshall this summer, is chiefly to determine by permanent sample-plot methods the source of seed and the interim happenings to reproduction following forest fires and logging. Seed catchers and pairs of screened and unscreened quadrats are to be located in series on large fresh burns of 1926, furnishing different types of seed tree conditions. For example, a large burn with an isolated clump of seed trees is to have radiating lines of seed catchers for the purpose of studying the effectiveness of seed dispersal in all directions. Another example is that of a large burn inside of which can be found a spot or two of ten to forty acres containing approximately one to ten scattered living and injured trees per acre. In the case of some burns it is known, and in the case of many others it is suspected, that trees of this sort live only a few years before they succumb either to fire injury, windfall, or insect attack. The purpose here is to learn how long these trees live and their effectiveness in seed production. Annual examination of the trees themselves and all screened and unscreened quadrats will constitute the method of attack in this case. Mr. Evenden of the Bureau of Etomology is to make annual examinations of the trees to determine the part insects play in causing their death.

Another object of the work this summer will be to lay the basis for distinguishing between reproduction arising from stored seed and from seed shed after logging or forest fires. This will be done chiefly by parallel screened and unscreened reproduction quadrats on cuttings and burns.

Gisborne started a swingaround trip to the key stations of the fire weather forecast service. These stations are located in seven or eight Forests in Northern Idaho and Western Montana. As this is a cooperative project with the Weather Bureau, it was arranged that Mr. Chapin of the Spokane office of the Weather Bureau make the trip with Gisborne this year. This is the Weather Bureau's first inspection of the stations. Inspection and adjustment of existing instruments and installation of additional meteorological instruments will occupy some of the time of the men.

Thanks to expeditious handling of the lightning storm data, by the Washington Office, Gisborne was able to complete a compilation of the District-wide data for 1926, and to prepare a summary for distribution. As 1926 was probably the most disastrous year of lightning in this region, it was urgently desired to find out promptly what the lookout reports would show.

This compilation clearly showed that the 1926 reports agree with those of 1924 and 1925, in showing that the characteristics of the average fire-starting storm are sufficiently different from those of the average safe storm so that it should be possible for the lookouts to classify them, and so inform their rangers, even before many of the resultant fires are discovered and located.

There were 2209 station-storm observations obtained in 1926 in D-1 alone. Between June 10 and September 20 there were only eighteen days when not a single observer reported a thunderstorm. The peak days of the season were July 6 and August 29, when 165 and 182 stations, respectively, reported lightning. On July 12, the most disastrous day, 140 stations reported storms.

A mapping of every report for July 12 and 13 indicates very clearly that these storms were of the convectional type, which cannot be predicted accurately by the district forecasters. The local weather conditions were such as to indicate the strong probability of lightning storms, but from all the measurements made there seems to have been nothing which could have been used to foretell the intensity of the lightning which came the afternoon of July 12 and that night. This year we will endeavor to have our quadrant electrometer in action in order to determine whether or not atmospheric potential gradient is the additional key to this important problem.

In connection with the white pine yield study, word from Washington is that Haig will not be able to complete the office work by early June, as had been expected. As he is to take a year's leave for advance study at Yale Forest School beginning September 1, he will not return to the Station this summer, but will spend the remainder of the time in Washington completing the computations on the yield study and also on a reproduction study of old timber sale areas. It is expected that the preliminary draft of the normal yield tables will appear in early summer.

An extension of leave until August 31 has just been granted Kempff who is spending the year in advance study at Harvard Forest. This was requested in order that he might be able to complete his research problem.

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## ROCKY MOUNTAIN FOREST EXPERIMENT STATION

### May Activities

Having completed the lodgepole taper curves during the latter part of April, Roeser has spent most of May at the Fremont field station. One of the principal activities was the completion of the germination tests and the preparation for sowing on the Nebraska of the seed lots collected last fall from native Nebraska yellow pines showing great-

er or less resistance to the gall-rust disease. These will be grown in the Halsey nursery without any special treatment except segregation of the lots of different seed trees, and, when ready for field planting, will represent the first practical step, aside from pruning of diseased trees, taken toward the elimination of the Peridermium from the Nebraska plantations. It is expected to so place these lots in the field that they can be closely watched, so that the non-resistant individuals can be eliminated, and that there will be formed, in due time, a seed-bearing stand which will be completely free of any tendency to harbor the Peridermium. At the same time, due to the greater growth vigor which the Nebraska native stock apparently possesses when planted in the sandhills, a step toward decreasing the severity of damage by the tip-moth is expected to have been taken.

Bates attended the Madison Laboratory conference from May 2-18, inclusive, and returned to the office after a few days leave. Since that time he has been engaged in the preparation of a paper for the International Soils Congress, on an outline of the possibilities for the new Section of Biology at the Madison Laboratory, and on a paper to be read at the silver jubilee of the Nebraska National Forest.

June Plans

After attending the Nebraska celebration, which will require only three or four days, Bates expects to complete the following jobs before leaving Colorado Springs to take up the work of the Section of Biology:

| | |
|---|---|
| Completion of T-5 tests at Fremont | 7 days |
| Report on recent light experiments | 5 days |
| Writing station history | 2 days |
| Lodgepole reproduction report | 7 days |
| Segregation of files and library material for transfer to Madison | 3 days |
| Routine check of property, etc. | 3 days |
| Other District obligations and miscellaneous jobs | 7 days |

If these jobs are all completed, it is evident that Bates will not be ready to leave Colorado Springs before the middle of July. Plans have not been made beyond that time, but it is contemplated that if any western travel is to be done this year it might be done before taking up residence at Madison, the visiting of the eastern and southern stations to be done later in the season.

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During the first part of the month Pearson made some interesting observations in regard to erosion in the Navajo Indian country. On extensive areas below an altitude of 6000 feet the rocks are practically bare of soil. This applies particularly to the sandstone formation. The first thought to suggest itself is that this condition is due to overgrazing. Although overgrazing is undoubtedly an important factor it is probable that we have to deal with other forces of still greater importance. Present indications are that the sandstone slopes in this region never did bear very much soil. For example, there are places where "shoestring" gullies have formed in the bare rock, undoubtedly the work of centuries if not ages. The effect of overgrazing, however, is apparent in the canyon bottoms. In many places the canyons widen out into good-sized alluvial valleys which are tilled by the Indians. Judging from present indications farming is on the decline in Navajo Canyon. A good stream of water was flowing through the bottom of the Canyon, but had cut into the alluvial valley to a depth of from 25 to 50 feet, thus making it impossible to use the water for irrigation without expensive dams to raise it above the present channel.

Cooperrider and Pearson in company with Supervisor Grubb of the Prescott, recently made another examination of the Clarkdale smelter smoke area. The area on which the brush is dead or severely damaged is somewhat larger than earlier examinations indicated. There is no doubt that practically all tree and brush growth will be exterminated over a good many square miles. There is every evidence, however, that grasses are uninjured by the smoke. On areas which have been lightly grazed on account of rough topography or distance from water, a good grass turf remains even where all shrubs have been completely killed. It is evident that the one chance to maintain a soil cover lies in the preservation of native grasses. Aside from the mining industry, the watershed is undoubtedly the greatest resource involved in this region. The area affected by smelter smoke constitutes an important part of the Verde watershed which will supply the water for irrigation of the new Paradise Valley project adjoining the Salt River Valley. Plans for development of this project, comprising some 90,000 acres, have been under consideration for many years. According to recent announcements an agreement has been made whereby the financing of the project is to be backed by the Salt River Water User's Association.

Cooperrider and Copple arrived from Roosevelt May 30, to take up their grazing studies work in the Flagstaff region. They will make their summer headquarters at the Experiment Station.

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## MANUSCRIPTS RECEIVED

### PACIFIC NORTHWEST

Timber Growing and Logging Practice in the Douglas Fir Region.
T. T. Munger. (In page proof).

Working Plan for a Study of Forest Fire Behavior.
R. E. McArdle. (Office Report).

### NORTHEASTERN

Yield of Second-Growth Western Yellow Pine. C. E. Behre.
(To University of Idaho).

Reproduction on Pulpwood Lands in the Northeast with Suggestions for their Management. Marinus Westveld. (For Dept. Bulletin).

Yields of Second-growth Spruce and Fir in the Northeast.
Walter H. Meyer. (Revised Report).

### NORTHERN ROCKY MOUNTAIN

Experiments in the Use of Fertilizers at Savenac Nursery.
W. G. Wahlenberg (For Jour. Agr. Research).

Measuring Forest Fire Danger in Northern Idaho. H. T. Gisborne.
(Ms. to PR for transmission to Department).

### WASHINGTON OFFICE

Timber Growing and Logging Practice in the Central Hardwood Region.

C. R. Tillotson. (Dept. Bul. Page Proof to Gov. Print. Office).

## IN PRINT

Korstian, F. W. and P. W. Stickel. The Natural Replacement of Blight-killed chestnut. Misc. Cir. 100.

Korstian, F. W. and P. W. Stickel. The Natural Replacement of Blight-killed Chestnut in the Hardwood Forests of the Northeast. (Jour. Agr. Res. April, 1927).

Forbes, R. D. Southern Pine Lands Embrace One-fourth of Timber of the United States. (Naval Stores Review).

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## Cooperation - General Supply Committee

The work of making awards for the fiscal year 1928 on Class 7, Lumber, Millwork, Boxes and Building Materials, was completed during the month. In this connection it is interesting to note that the prices at which contracts were made on lumber were from 10 to 25 per cent lower than the prices quoted the year previous.

## RE, Census - Wood Preservatives, 1926

The wood preserving industry in the United States continues its steady growth. The statistics for the year 1926, the latest that have been compiled, show that at the close of the year there were in existence in this country 187 plants for the preservative treatment of wood in various forms. Of this number 180 were in active operation and 7 were idle. During the year 14 new plants were constructed. In 1926 there were 13 more plants in operation than the 167 that reported in 1925. The following figures show, comparatively, the quantities of the different preservatives used and the amounts of the various classes of material treated in 1925 and 1926.

### Preservatives Used

| Kind | 1925 | 1926 |
|---|---|---|
| Creosote | 167,642,790 gals. | 185,733,180 gals. |
| Petroleum | 13,048,539 " | 13,317,022 " |
| Paving oil | 2,080,287 " | 2,541,563 " |
| Zinc chloride | 26,378,658 lbs. | 24,777,020 lbs. |
| Misc. preservatives | 331,591 gals. | 259,961 gals. |

### Material Treated

| Kind | Quantity Treated (cubic feet) 1925 | 1926 |
|---|---|---|
| Crossties | 187,691,733 | 187,963,614 |
| Poles | 42,204,413 | 49,511,088 |
| Construction timbers | 27,992,452 | 31,147,287 |
| Piles | 9,636,747 | 12,420,977 |
| Wood blocks | 3,408,489 | 3,689,424 |
| Cross-arms | 621,705 | 1,344,406 |
| Miscellaneous | 2,918,999 | 3,245,283 |
| Total | 274,474,538 | 289,322,079 |

Of the total of 62,654,538 crossties that were subjected to treatment in 1926 a total of 2,434,307 were lodgepole pine, and it is interesting to note that fully 80 per cent of them were cut from National Forest timber.

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## FOREST PRODUCTS - DISTRICT 1

### The Air Seasoning Bulletin

The completed manuscript, "The Air Seasoning of Western Softwood Lumber," which was prepared jointly by Districts 1, 5, and 6, was sent to Washington May 27 for final editing and approval. It is intended that the report may be published as a Departmental Bulletin.

### The Idaho Forest and Timber Handbook

A letter from Dean Miller of the University of Idaho was received May 20 stating that it had been decided to publish the Idaho Handbook. The contract will be let in the very near future and 3500 copies are to be printed.

The entire manuscript was given a thorough review, and the Directory section was brought up to date. Dean Miller of the Idaho Forest School; C. B. Morse, D-4; S. V. Fullaway, Jr.; C. N. Whitney, and R. N. Cunningham are co-authors of the Idaho Forest and Timber Handbook.

### Sawmill Utilization

In working up the data collected by the District Mill-Scale crew at the headsaw, edger, trimmer, and along the waste conveyor, considerable interesting information was secured. The losses in manufacture which result under a certain standard of utilization vary to a considerable extent among like mills operating in the same district and supplying the same markets. Of all the factors which affect the amount of footage that goes into slabs, edgings, and trims, the methods of sawing in use exert by far the greatest influence. These two facts are brought out in the table which follows.

Amount of Manufacturing Losses Resulting from the Production of 1000 Feet of Western White Pine Lumber.

| Design-ation | No. of Logs (Basis) | Saw-dust (Bd. Ft.) | Merchantable lumber in slabs (Bd.Ft.) 4' stock | Merchantable lumber in slabs (Bd.Ft.) 6' & over | Merchantable lumber in slabs (Bd.Ft.) Total | Edgings in (Bd. Ft.) 1" wide entr lgth | Edgings in (Bd. Ft.) 2" & over width | Edgings in (Bd. Ft.) Total Amt. | Trims in Bd. Ft. | Total manufacturing losses. Exclusive of sawdust (Bd. Ft.) |
|---|---|---|---|---|---|---|---|---|---|---|
| Mill A | 453 | -- | 0.8 | 2.0 | 2.8 | 2.3 | 0.5 | 34.0 | 38.4 | 75.2 |
| Ave. 7 Mills | 10,359 | 209 | 1.5 | 2.3 | 3.8 | 2.3 | 0.3 | 49.9 | 59.4 | 113.1 |
| Mill B | 1,517 | -- | 2.3 | 4.3 | 6.6 | 2.9 | 0.2 | 51.9 | 67.1 | 125.6 |

Neither Mill A nor B saves and markets 4-foot stock. Both mills are cutting in like runs of white pine logs and are producing the same character of product. Yet the manufacturing losses in Mill A are 50.4 board feet less for every 1000 feet of white pine lumber produced. This is a 5% saving on the basis of a thousand feet. It will be interesting to know that when the two runs were compared upon a 1-inch top-diameter basis, the overruns obtained were 23.47% at Mill A and 18.07% at Mill B. This is a difference of 5.4% in favor of Mill A. This increase in footage is no doubt due in part to the improved method of taper sawing which is standard practice at Mill A. Only an occasional butt log is taper-sawed at Mill B.

The average of seven mills shows a total manufacturing loss of 322 board feet for every 1000 feet of lumber produced. The average salvage in lath and wood, however, utilizes approximately 52% of the 113-foot loss in slabs, edgings, and trims. This may be increased 12% by picking molding stock from edgings and short box common from trims. It is safe to say that at least two-thirds of the sawdust is utilized to furnish motive power for the plant.

## Miscellaneous

An article, "Sawmill Efficiency Not Measured by Volume of Production," by Mr. Bradner will be run serially in the TIMBERMAN, the first installment appearing in the June issue.

## Lumber Census

The Idaho and Montana canvass was reported closed on May 16. Preliminary figures resulting from a compilation of the returns in the District Office were released for publication on May 27, after approval by the Bureau of the Census. The aggregate lumber cut of Idaho and Montana during 1926 was shown to be 1,330,122 M feet, which is 13% less than the combined cut of the two states in 1925. In comparison with other years the 1923 cut is still shown to be the largest that has ever been reported for Montana, but a new high record was established for the State of Idaho in 1925. A comparative statement follows:

TOTAL LUMBER SAWED - M FEET BOARD MEASURE

(Mills cutting less than 50 M' each year excluded)

| State | 1923 | 1925 | 1926 | Per cent of decrease 1923-1926 | Per cent of decrease 1925-1926 |
|---|---|---|---|---|---|
| Idaho | 1,072,930 | 1,140,575 | 951,373 | 11.3 | 16.5 |
| Montana | 426,917 | 388,854 | 378,749 | 11.3 | 2.6 |
| Combined cut | 1,499,847 | 1,529,429 | 1,330,122 | 11.3 | 13.0 |

1926 Lumber Production - M' B.M.

| Species | Idaho | Montana |
|---|---|---|
| Idaho white pine | 354,661 | 15,176 |
| Western yellow pine | 305,995 | 171,775 |
| Western larch | 73,532 | 112,218 |
| Douglas fir | 106,483 | 67,529 |
| All others | 110,702 | 12,051 |
| Total | 951,373 | 378,749 |
| Lath production - M Pcs. | 109,935 | 32,282 |
| Shingle production - M Pcs. | 20,059 | 275 |

All 1926 figures are preliminary and subject to correction.

LUMBER CUT AND MOVEMENT

| Av. Mill-Run Prices | Annual 1925 | Annual 1926 | First Q. 1927 |
|---|---|---|---|
| Idaho white pine | $37.37 | $37.77 | $38.48 |
| Pondosa pine | 28.02 | 26.33 | 26.28 |
| D. fir and larch | 19.35 | 17.78 | 17.52 |
| White fir | 20.14 | 19.10 | 16.46 |
| Spruce | 24.28 | 23.73 | 23.77 |

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FOREST PRODUCTS - DISTRICT 5

Of this two months, Mr. Brundage was away from the office on a trip to Madison from April 8 to May 19, while Mr. Hill was absent on the same errand from April 28 to May 31. Both men attended the annual program conference, Mr. Brundage also taking the dry kiln course at the Laboratory during April, and Mr. Hill running down to the University of Michigan for conferences and an address to the junior and senior students of the forestry school. This left scant time for district work from either.

Air Seasoning

During early April Mr. Fullaway's bulletin was reviewed in manuscript by both Hill and Brundage and suggestions submitted. Both of them also participated in a conference on that subject at the Laboratory.

Heptane

The most important development of the whole period, from the standpoint of the district Products work, was the arrival at definite agreement by all parties for the tapping of Forest Service Jeffrey pine timber on the Lassen Forest for heptane by the California Chemical Corporation, the work to be superintended for the company by former forest ranger E. C. Shaler, who conducted the experimental turpentine work of this office a number of years ago. The negotiations leading up to this undertaking were conducted by the Products office with the cooperation of the Forest Products Laboratory, and the cuppage sale will entail a considerable experimental project jointly between this office and the California Forest Experiment Station with cooperation of the Laboratory.

Termites

On April 12 Mr. Hill attended, by request, a conference of lumber interests at Los Angeles, and on the 14th a similar one at San Francisco,

to advise them respecting the seriousness of the termite menace in Southern California and the desirability of their financing a California trip by Dr. Snyder of the Bureau of Entomology. It is understood that the latter has since been undertaken when possible.

Lumber Census

Only about a half dozen delinquents remain unaccounted for, and it is hoped that this canvass can be cleared during June. At Madison Hill and Brundage participated in a conference with Mr. Rolle of the Census Bureau covering especially the revision of the long biennial form.

Economic Council

Mr. Hill called a meeting of the Committee on Natural Resources on April 25, at which a most interesting account of the status of Pacific Coast marine life resources was presented by Dr. Barton W. Evermann of the California Academy of Sciences, also a revised statement respecting mineral resources by Deputy Chief Walter Bradley of the State Mining Bureau, and necessary action taken on current projects of the Committee. On May 25, during Mr. Hill's absence at Madison, occurred the annual meeting of the Council at San Francisco, for which Mr. Hill forwarded a report for the Natural Resources Committee.

Miscellaneous

On April 7 Mr. Hill spoke before the Oakland Technical High School Club on forestry and forest products work, and on April 20 gave a radio talk over KTAB, Oakland, as part of a John Muir birthday program, on "What the forests contribute to the joy of living." On May 23 he talked to the combined juniors and seniors of the forestry school at the University of Michigan on two subjects, "Difficulties in the young forestry graduate's first contact with a Forest Service job," and "Forest Research." He also gave two days in April to sessions of the District Training Committee and served as the Forest Service member of the Charles Lathrop Pack prize essay award committee for the University of California.

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FOREST PRODUCTS - DISTRICT 6

Washington Wood-using Industries Report

Parts 1, 2 and 3 of "The Forests and the Wood-using Industries of Washington," by Gibbons appeared in the May 1 issue of the West Coast Lumberman, and a part of Part 4 in the May 15 issue.

## Hodgson's Article

"Forest Thrift" by Hodgson appeared in the May 1 issue of the West Coast Lumberman. Hodgson compares the operations of the Simpson Logging Company at Shelton, Washington, with the operations at Cloquet, Minnesota, and stresses the advantages of an integration of wood-using industries in securing better utilization of wood at both the mills and logging camps.

## Uses Woods Waste Data

The May 1 issue of the Pacific Pulp and Paper Industry featured an interview by Hodgson, the story reviewing some of the findings of the general woods waste survey in the Douglas fir region under the caption "Waste - But it Needn't Be."

## General Survey of Woods Waste in the Douglas Fir Region

Hodgson and Johnson spent most of May in securing data in the field from three companies operating in the Cascade Range of the Willamette river region of Oregon. Two of these companies are logging in National Forest timber under a sale contract. One of the companies studied is working in timber which is from 40 to 70 per cent defective, and this reflects itself very materially upon the amount of waste wood left on the ground after logging, even after the rotten and stained wood has been deducted from it. On one of the acres studied the material left, mostly in the form of cull logs, the sound portions of which were classified as cordwood, amounted to 72.6 per cent of the original stand. This material was examined very carefully and it was found that very little of it could have been utilized under present economic conditions at a profit.

The last week in the month was spent in the office working up the data collected.

## Gibbons Visits Forest Products Laboratory

Twenty-five days - the latter part of April and the bulk of May - were spent by Gibbons in getting a close-up of what is being done in products research in District 1 and at the Forest Products Laboratory. A number of sawmills and other wood-consuming operations were visited with Fullaway at Spokane, Potlatch and Coeur d'Alene. With Bradner of the office of Forest Products, Missoula, the Inland Empire sawmill studies were covered in considerable detail; in fact, it was to get first-hand knowledge of these studies that Gibbons stopped off at Missoula.

Over two weeks were spent by Gibbons at Madison, attending the Laboratory's plan-of-work conference. Clearly the Laboratory is doing a lot of worthwhile work, but the thing that impresses one the most at these conferences is the seemingly endless number of jobs of one kind or another there is to be done. This, of course, is to be expected, but it takes a Laboratory conference to bring anything like full realization on this score.

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## RANGE RESEARCH

## WASHINGTON

### Schoeller's Detail

Mr. J. D. Schoeller has been offered a position in the administrative organization of District 5 and will leave some time this summer. To facilitate the completion of the Carrying Capacity manuscript on the Jornada work, Mr. Schoeller has been detailed to Washington for a period of approximately six weeks. He arrived on June 2, and immediately settled into the work of organizing his material.

### Manuscripts

Forsling's "The Utilization of Browse Forage as Summer Range" has now been edited and has been returned to him for some further consideration.

Mr. F. G. Renner's Bibliography of Grazing Literature is now being checked by Miss Stockbridge of the Service Library and by Mrs. Gassaway of this office. This check is made to assure covering all of the essential manuscripts.

Extension Circular 41, "Feed Resources, Eleven Western States," was mimeographed during the month by the Extension Service in its revised form and copies have been sent to all Districts, Supervising Officers and Experiment Stations. Requests have come in for so great a number that an additional supply is being requested from the Extension Service, whose supply is already exhausted.

Mr. R. R. Staples of Natal, South Africa, the author of "Experiments in Veld Management," which was reported in last month's report, will visit the United States during the summer. A request has been sent to him to visit the three experiment stations and the work in the districts.

All eligibles on the Junior Range Examiner register submitted to the Forest Service, have now been offered appointment with the possible exception of Valentine Sajor who is on leave from the Philippine Forest Service and desires appointment only until December 31 of this year. Three were appointed as Junior Range Examiners and the balance as Forest Rangers. No word has yet been received regarding whether Messrs. Wiggins and Lehrdas whose names were submitted to the Indian Service have been appointed by that Service.

## FORAGE INVESTIGATIONS

### Plant Identification

Notwithstanding the absence of Mr. Tidestrom in Arizona, a great volume of identified plant material was returned here from the Bureau of Plant Industry during the month. Sixteen collections were reported to the field, with lists and 513 photostatic prints of economic notes. One new collection was handled during the month. 487 plants were mounted in May and about the same number filed in the herbarium.

### Accumulated Cyperaceae Returned

An accumulation of Cyperaceae, including the genera Carex, Eleocharis, Rynchospora, Scirpus, and Stenophyllus, (representing material submitted during the last three years or so) was returned during the month. The Carex material was determined by Mr. Kenneth K. MacKenzie of New York City and Maplewood, N. J.; the other genera were identified by Dr. Nathaniel Lord Britton, Director of the New York Botanical Garden. All this material has now, or soon will be, reported on to the field.

### District 6 Lupines

Professor C. Piper Smith, of San Jose, California, has returned the District 6 lupines sent him from Washington or direct by the Portland office and local Supervisors. The nomenclature has been revolutionized, as anticipated! It has been necessary to preserve a good deal of this field material (representing early, unduplicated numbers) here but, in all such cases, photographs have been taken for the field records.

### Some Botanically Interesting Plants of the Month

Lincoln National Forest. - Ranger Robert B. Ewing's collection of Galium trifidum subbiflorum Wiegand and Senecio serra Hook. (his nos. E-50 and E-38, Washington office nos. 50829 and 50848, respectively) seem to have made two additions to the known Flora of New Mexico. At least neither are in the Flora of New Mexico nor would the ranges as given in other manuals seem to include that State.

Cache National Forest. - Supervisor Carl B. Arentson's no. 11, our no. 51648, seems to be the first record for Idaho, and the second collection known of Mertensia praecox Smiley. Unless Mr. Arentson has confused this with some other "bluebell" his note that this species is "General over Cache Forest" is of great interest.

Uinta National Forest. - Viola aurea Kellogg, the familiar golden violet ranging from Oregon to extreme western Nevada, and California, has never hitherto been reported from Utah. It is extraordinary, therefore, to have three specimens of it in the same collection from the Uinta, viz.: Mr. Arnold R. Standing's nos. 100 and 139 and Mr. Chas. H. McDonald's no. 426, serial nos. 51877, 51879, and 51881, respectively.

Jornada Range Reserve. - In his no. 455, serial no. 49291, Mr. R. S. Campbell has submitted a bulrush (from the Headquarters Tank) in which Dr. Britton has taken a keen interest. Dr. Britton has tentatively referred this specimen to Scirpus torreyi Olney, hitherto unknown from New Mexico, though he says the achene is a little different from typical torreyi.

## Dr. Blake leaves for San Francisco

Dr. S. F. Blake of the Bureau of Plant Industry, who has given us freely of his great store of taxonomic knowledge — especially in the difficult group of composites, has left for a summer's stay in San Francisco and California. He will do summer school work at Palo Alto and perhaps elsewhere and is especially desirous of checking up the composites which Dr. Greene described from the San Francisco Bay region. Dr. Blake hopes to get onto some of the District 5 Forests, if time permits, and we have furnished him with a letter of introduction, maps, and other literature at our disposal.

## Dr. Marsh's Wild Tobacco and Coyotillo Bulletins

During the month Dr. Marsh's prospective bulletins on wild tobacco (Nicotiana spp.) and coyotillo (Karwinskia humboldtiana) were reviewed and we were able to furnish him with some slight range extensions and certain other notes.

## District 4 Issues Plant Collection Leaflet

Under date of April 16, 1927, District 4 issued a four-page mimeographed leaflet, signed by Assistant District Forester Winkler, entitled "Instructions for Arranging Supervisors' and Rangers' Herbaria, and for the Collection of Specimens." This is an admirable piece of work and it would be gratifying to see other Districts issue similar instructions governing the conduct of this project under their supervision. The syllabus, "Ten Points to Watch," is especially opportune. Where the Washington office has no data on an important phase of the Form 767 (such as date of collection, elevation, forage value, or collector's name) we have been using dashes; otherwise the procedure in this office does not differ in any material respect from that outlined in the District 4 prospectus, save only that question might be raised over the District 4 rule that, in case of joint collections, only one collector's name is to appear on the Form 767; there are cases where this ruling might cause serious injustice.

## DISTRICT 6

Progress Report on the project "Grazing Management of Cut-Over Lands" is at last completed and is now in the stenographer's hands for final typing. Completion of this report, with a number of minor items, in preparation for the field season, occupied the time up to May 7.

The first field trip of the season was made with Mr. Gabrielson of the Biological Survey in charge of Rodent control work in Oregon. The Siskiyou, Crater and Ochoco Forests were visited during May and the trip was mutually advantageous, Mr. Gabrielson desiring acquaintance with our grazing-research methods and projects, also the effect and value of control work. We were interested, on the other hand, in the methods and results of rodent control and the damage sustained particularly in connection with the project on the Ochoco.

On the Siskiyou and Crater Forests assistance was given in the annual spring recheck work.

### Porcupine Control

On the latter Forest the area on Butte Creek, where winter porcupine poisoning is being undertaken by the Biological Survey, was also examined. Very effective control work is being secured by the salt-poisoning method.

Judging from the methods used on a number of their dens visited, particular pains are being taken by members of the Biological Survey to prevent any of the poison baits being taken by domestic stock or deer. The strychnine salt is placed far back in the dens which are found in the talus slopes and along the rimrock, inaccessible to livestock but apparently found and relished to their sorrow by wood-rats, porcupines and other rodents. Mr. Gabrielson reports migration of the males from the high range to the edge of the timber during this season of the year, returning late in the season to the higher altitudes. This migration is being followed up by poisoning during the spring and early summer in the lower country. It is during this period that the porcupine is apparently feeding mostly on succulent forage and is a nuisance to the farmer's hay fields. On the Ochoco a porcupine was observed feeding on the vegetation in one of the open parks near Divide Station, where the vegetation had just started. This animal was watched for some time while feeding and the area closely examined afterwards. A considerable portion of practically all herbaceous species present were found to have been grazed - no discrimination was apparent. From this it was concluded that where abundant, porcupines may be as important an element in range depredation as are other rodents, in addition to their destructive habits with timber.

Gopher Control

Examination of part of the 1800 acre gopher control project area on the Ochoco, undertaken in 1916 and 1917, was also made on this trip. Reinfestation after 10 years was found to be comparatively light, estimated as high as 15% to 25% in some places. In others there was no evidence of reinfestation indicating the effectiveness of this work. Considerable improvement in the vegetation during the period has been reported. It was, however, too early, the vegetation being too immature, to make any accurate estimate. The area will be repoisoned by the Biological Survey this season in connection with their other work.

Plant Collection

Due to the late season vegetation in the low country was now just prime for the collection of plant specimens. This was especially true in the interesting country in the Siskiyous. A number of plants new to our District 6 herbarium were accordingly collected during the trip. Among these may be mentioned four violets (V. lobata, macloskeyi sheltoni, occidentalis), Clintonia andrewsiana, Trillium rivale, Scoliopus (sp?). Vegetation above 4500 feet was found, however, too undeveloped at this time to procure material.

New Grass

Specimens were procured of an interesting grass (Poa bulbosa) accidently introduced into the Medford section and naturalized on the "desert" east of there, which is being greedily eaten by cattle.

This grass, which forms bulb-seed, is now being cultivated as a hay and pasture grass near Medford and gives promise of being a valuable addition to the early maturing pasture grasses. A native of Europe, accidently introduced here in the Medford section, it is reported to be the only known place in the United States where the grass produces these curious bulb-seed. Attractive prices are being received for the "seed" for which the grass is being harvested.

New Flora of Oregon

Professor Peck of Willamette University was visited on the trip. Professor Peck is writing a new "Flora of Oregon." Hearing of our collection and herbarium he has requested permission to consult it. He has likewise requested any duplicate Forest Service material collected in Oregon which can be spared.

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## GREAT BASIN STATION

### Field Work

Field work for the season was started on April 29 when Forsling, Nelson and Mann arrived at the field station near Ephraim, Utah. Part of the trip (about two miles horizontal and 900 feet vertical distance) was made on the snow. The season is much later this year than for some years in the past on account of the greater than average snowfall during the winter and cold weather that prevailed late into April.

Early work consists of measuring the runoff and erosion from melting snow in the Erosion and Stream flow project and in obtaining records of plant development in the Period Study and Climate and Plant Growth Projects.

Forsling returned to Ogden on the 9th of May to spend the remainder of the month in the office, working up data from the U. S. Sheep Experiment Station at Dubois, Idaho prior to the annual field day at that Station on May 30.

Junior Foresters Ritter and Lexen, spent part of April on beetle eradication on the Ashley Forest after which Lexen returned to the Weiser Forest. Mr. Ritter remained with us until May 7 and then returned to the Idaho Forest. G. D. Pickford, who has been with the Station since January 1, left us on April 31 and went to the Targhee Forest for some experience on a ranger district. Word has just been received that Pickford passed the Junior Range Examiner examination with a mark above 85 per cent. With the assistance of these three men a lot of compilation work was completed during the winter.

### Notes on Fire and Plant Succession in the Sagebrush Type

The effect of fire on forage is a controversal subject and will remain so until thorough research has revealed the true light in the matter. Some range users, and among them men who are known to be careful observers, are of the opinion that burning is a means of opening the dense stands of sagebrush in certain localities in the Intermountain Region so that more grasses and other forage plants can become established. Other interests argue that forage plants will be reestablished fully as rapidly and extensively, if not to better advantage, in the brush type by proper range management, and that the use of fire under most circumstances damages the soil and is a menace to timber, watersheds, and other resources. Both sides have arguments based largely on more or less careful observation that substantiate their viewpoint.

Although only careful and complete study will supply the actual facts, certain observations appear worthy of consideration. Old timers tell us that in pioneer days there was much more grass and much less sagebrush in the foothills and valleys between the mountains and plateau areas in Utah than there is today. Sagebrush was present in the early 50's but not to the extent that it is now. The assumption is that overgrazing has been quite influential in reducing the amount of grass and other herbaceous cover so that the sagebrush has been given the opportunity to spread. There is some good evidence to support this point of view. In many places shrub growth, aside from apparently crowding out the better forage plants, is becoming such a thicket as to seriously interfere with handling livestock, especially sheep. It is not surprising that there should be an inclination to want to let fire burn through these areas.

It seems rather apparent that repeated burning would not only destroy the sagebrush but most all other perennial vegetation, impoverish the soil and subject it to serious erosion on the slopes. The vegetation on such areas would be reduced in the main to annual grasses and weeds that followed the burns. There are extensive areas in Utah apparently once occupied by sagebrush, blue-bunch wheatgrass, and Sandbergs' bluegrass, that are now supporting mainly cheat grass, filaree and other annuals. Filaree appears to be spreading quite rapidly. It is possible that one or more factors such as repeated burning, occasional burning followed by heavy overgrazing, or overgrazing that destroyed the perennial herbaceous vegetation, thus permitting the invasion by cheat grass that in turn competed successfully against sagebrush, are responsible for this condition.

A fire in 1910 burned over much of what is now included in the lands of the U. S. Sheep Experiment Station in the sagebrush, blue-bunch wheatgrass type near Dubois, Idaho. After sixteen years the sagebrush is no less dense on the burned area than on unburned area; there is not much difference in the amount of grasses and other herbaceous vegetation on the burned as compared to unburned areas where continued overgrazing has not been practiced. On areas heavily overgrazed subsequent to burning, there is very little herbaceous vegetation, the soil lacks humus and appears to be lacking in fertility.

Certain degrees of burning the sagebrush grass type in places in the Intermountain region is followed by the invasion of thick-headed wheatgrass (Agropyron dasystachyum). The right of way along the O.S.L. R.R. near Dubois, Idaho, is probably burned every few years. Sagebrush and blue-bunch wheatgrass has been almost completely destroyed and has been replaced by thick-headed wheatgrass and some grant rye and porcupine grass. The same is true along the U.P. R.R. near Nephi, Utah. The destruction of the original brush and grass cover favors the invasion of thick-headed wheatgrass. The grass spreads by means of rootstocks and once established it spreads rapidly and forms a good stand. It has an advantage in this respect over grasses wholly dependent on seed for revegetation. Burning the sagebrush seems to favor the spread of this species.

The opinion of some observers that burning aids the invasion of grass is no doubt based on the observation of cases of where thick-headed wheatgrass has come in following burning. In reaching such conclusions two points have been lost sight of. One is the inferior value of thick-headed wheatgrass as forage as compared to blue-bunch wheatgrass and the bluegrass. Thick-headed wheat becomes coarse and wiry early in the summer and is not such good feed for fall and early spring grazing as the other species. Secondly, well cared for range in the sagebrush-blue-bunch wheatgrass type will produce as much if not more forage than the thick-headed wheat type under ordinary methods of use. At least the comparison of some well cared for unburned areas with some burned areas where thick-headed wheatgrass has come in indicates that the former are producing fully as much of a greater variety of forage of better quality.

The Great Basin Station has two plots now under complete protection against grazing, but formerly heavily overgrazed, where sagebrush had apparently increased materially in density at the expense of the grasses following overgrazing. On one of these grasses and sedges, but principally streambank wheatgrass (Agropyron riparium) have become established, are spreading very rapidly and the sagebrush is dying out. On the other blue-bunch wheatgrass is now well established and the sagebrush is on the down grade. Dead bushes of sagebrush are common in both plots and there is a shortage of young plants to take their place. One theory to account for these results is that the grasses are able to compete successfully for soil moisture against the established plants. Another may be that the sagebrush is a comparatively short-lived shrub and the grass cover prevents the establishment of sagebrush seedlings to take the place of the old plants that perish.

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## JORNADA RANGE RESERVE

### Range Conditions & Precipitation

Weather conditions have been rather uniform throughout the month. The days have been clear and warm and the nights cool. High winds have occurred at more or less regular intervals of two or three days.

No precipitation has occurred this month. The total rainfall since the ninth of last December is 1.89 inches. The soil moisture is holding out well and the spring forage crop is fair in spite of several setbacks the vegetation received from drying winds and sand storms.

Cattle are in good condition and the prospects for the immediate future seem to be excellent.

The well at Headquarters is being cleaned out and new casing installed. The well has been out of commission since April 7th. This condition of affairs necessitated the removal of most of the cattle from Pasture No. 1 and all but two or three of the horses from Pasture No. 5. All water used at headquarters for both stock and domestic purposes is hauled from South Well six miles away.

Investigative Work

Compilation of data for Schoeller's bulletin on Carrying Capacit took up the greater part of the month. Numerous routine and odd jobs connected with the field and office have taken up all other available time.

Federal Business Association

The meeting of the local Federal Business Association was attended by Schoeller and Canfield on May 18th. Schoeller took up his duties as secretary of the organization. He was elected to this office while on leave in California.

Road Work

Grading and drainage of eight miles of the Jornada Road was completed by the first of this month. Preparations for the continuation of this work are being made. The grading will be resumed soon after July 1.

Personnel

Mr. R. S. Campbell reported for duty May 26th. Mr. Campbell has just completed a year of graduate work at the University of Chicago.

Director Schoeller is detailed to the Washington Office for a period of six weeks beginning June 1.

Mr. Frank Brown of Las Cruces is employed temporarily as stenographer.

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## SANTA RITA RANGE RESERVE

### Range and Stock Conditions

With only one very light shower during the month, spring growth has been at a standstill and at the present time all grass and weed growth has completely dried up. Browse species, however, are green and these, together with dry grass from last summer's crop assure an ample supply of feed until the present summer's crop comes on. Early spring rains gave promise of an exceptional spring growth. After starting several times growth was set back by cold weather so that the supply finally produced was considerably below normal. Stock are in good to excellent condition over the entire Reserve and considerable stock has already been contracted for June delivery at which time they should be in prime condition.

### Miscellaneous

During the month final check surveys of all the pastures have been completed and our new base map of the Reserve is nearing completion. Recent additions to the Reserve as well as slight changes in some of the pasture fences made the surveys necessary.

The new phone line up to Florida Station, made possible by the cooperation of District 3, is nearing completion and should be in operation shortly after the first of June.

Final plans for a bunk house at Florida Station have been approved and the building will be erected during June. Both the Biological Survey and the University of Arizona are cooperating in the project which will fill a long-felt need at the Station, since it will provide ample quarters for members of the above institutions as well as the temporary assistants at the Reserve.

### Visitors

Mr. Tidestrom of the Bureau of Plant Industry and Forest Service visited the Reserve on May 8, with Professor McGinnies who had his range management class out for a field trip to the top of Mt. Baldy. While at the Reserve Mr. Tidestrom looked over our herbarium and very kindly identified a number of our recent collections of plants.

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## THE EDITOR

A pleasant inovation was inaugurated when Korstian's "Natural Replacement of Blight-Killed Chestnut" appeared last month in a tinted cover. Recreation circulars have appeared in somewhat similar covers of light brown but this is the first Research publication thus treated. The cover illustration is especially effective.

Seven Research publications are at present at the Printing Office. These are:

Chapline and Talbot's Salt Circular No. 379 (reprint).
D-1 Requirements Report.
Douglas Fir Requirements Report.
"Brain Book" Statistical Bulletin.
Teesdale's "Control of Stain, Decay, and Other Seasoning Defects in Red Gum."
Central Hardwoods Requirements Report.
The Laboratory's "Suitability of American Woods for Paper Pulp."

These last few months the Printing Office has been handling composition very rapidly, so that we have received galley proofs ten or fifteen days after the manuscript reached the Printing Office and the page proofs within two weeks of the return of the galley proofs. There has, however, been no perceptible speeding up of the press work. This has been taking the customary two or more months. With Congress in session the Printing Office has averaged about six months for each publication, two months to produce the galley proof, two months to produce the page proofs, and at least two months for press work. We are at present saving about three months time on each publication in the Printing Office.

### The Art of Salesmanship

With nearly every manuscript revicwed the impression becomes deepened that no author can afford to overlook entirely the theory and practice of salesmanship. Hardly any of our publications, unless it be of the type of the statistical bulletin mentioned above, but what is endeavoring to sell something to someone. Even the publication that is intended solely for the perusal of the technical man is or should be endeavoring to sell to that man better methods or better conclusions from new data, a different set of facts from those with which he is familiar or a different way of looking at them. The more the publication departs from the technical bulletin and verges on the popular, the greater is the need that the author should consider himself in the light of a salesman making it easy and desirable for the reader to give his attention to the discussion presented.

Anyone who is learning to write high-grade advertising or material for a selling-by-mail campaign will be reminded at some time or other during his course of instruction that a hunter must aim at some particular bird rather than at the whole flock if he expects his shotgun to do any damage. The simile probably holds good for the writing of scientific publications. If we are producing a bulletin to be read by lumbermen and attempt to write it for lumbermen as a class and without any particular individuals in mind, the chances are that no one lumberman will recognize the fact that the publication is written for him, and, whether consciously or unconsciously, will get the impression that the discussion is a monologue delivered by somebody talking to himself.

If we write to lumbermen merely as a class, we can easily excuse scant or involved exposition of any one of the important points brought out in the discussion by imagining a hypothetical lumberman who would understand it. If, on the other hand, we are writing directly to some hard-headed, hard-boiled lumberman of our acquaintance and really have the desire to sell him the theory, methods, or facts, which we have to offer, we are not going to take the chance that he will misunderstand or overlook any of our important points; we are not going to let his attention wander if we can help it; his antagonism is not going to be aroused by any slighting reference to or consideration of his pet prejudices; he will not be talked down to, browbeaten, or soft-soaped; nor will we be contented to assume that specious arguments will be taken for solid sense.

Professor Billy Phelps used to say that if it was necessary for him to stand on his head in the class room in order to keep the interest of his class, he intended to begin the recitation by standing on his head. Many have thought that this mental attitude on the part of Prof. Phelps was quite as undignified as the physical attitude would have been. It was, however, consistently his point of view, and although history does not record that he was ever reduced to this particular expedient, the fact is that he did succeed in holding the attention of his classes; and, having their attention and sympathetic interest, he was in a position to impart to them a considerably larger share of whatever information he could deliver than if he had not given his first efforts to the problem of interesting and holding his audience.

In Forest Service publications there is no need to stand on one's head or to resort to any other tricks to excite attention. It is, however, necessary to so construct our publications that they will indicate to the casual as well as to the serious reader that we have made an earnest and intelligent effort to meet him on his ground and to make clear to him, courteously and persuasively, facts and conclusions of real value to him in his own field of interest.

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